200 meters away. At a fork in the channel a bending magnet switches the protons to one ring or the other.

About 400 successive synchrotron pulses will be stacked in the ISR until full intensity is reached—4 × 10^{14} protons (equivalent to a circulating current in each ring of about 20 amperes). Filling is expected to take an hour; when synchrotron improvements are finished, filling may take only five minutes. Momentum spread across the beam is expected to be 2%.

Franco Bonaudi, who is in charge of ISR construction, said in his talk that the ring will be complete this month. Half the magnet blocks are on site; the remainder are expected by the middle of 1970. First injection tests are scheduled toward the end of that year.

Americans are involved in three experimental proposals being considered by CERN: Alan Krisch (University of Michigan) and Giorgio Giacomelli (University of Bologna) propose to look for all reactions in which one or more pions are produced. Rodney Cool (Brookhaven), Leon Lederman (Columbia), Luigi DiLella and Emilio Zavattini (CERN) want to search for large-mass particles decaying into electron-positron pairs. Gerard K. O'-Neill (Princeton) proposed a system for the study of forward-angle scattering processes.

German National Magnet Lab Will Have 5-MW Capacity

A West German National Magnet Laboratory is under construction at the Technical University of Braunschweig. The lab, which is scheduled for completion by the fall of 1970, will have four water-cooled Bitter magnets. The field strength available is expected to be at least 175 kilogauss and may be as high as 200 kG. Power for the magnets will be supplied by a 5-megawatt rectifying plant fed from the local ac network and delivering up to 500 volts dc. According to Edward Justi at Braunschweig this rectifying plant is believed to be the first of its kind, avoiding all rotating machinery. It uses silicon rectifiers, thyristors and several thousand transistors in a Darlington cascade to keep the current constant to 1 part in 10^5.

The Volkswagenwerk Foundation has given $1.25 million towards the laboratory and will give an additional $300 000 for five-years' running. Funds for the laboratory building came from the local government.

The Francis Bitter National Magnet Laboratory at the Massachusetts Institute of Technology has produced the world's largest continuous magnetic field, 226 kG in air, and has a 10-MW power supply. At Nijmegen in Holland a laboratory that is expected to produce a 150-kG field is almost complete. It may in the future produce 300 kG. Other high-field facilities include Oxford with 125 kG, the Royal Radar Establishment with 150 kG and the Lebedev Institute in Moscow with 9 MW and 175 kG. Funds have been obtained to increase the power of the laboratory at Grenoble, France from 2 MW to 10 MW.

Apollo 11 Success Brings Astronomy Down to Earth

With the success of the Apollo 11 moon walk, astronomy truly becomes a laboratory science. Observers can now hold an astronomical chunk in their own hands and can assault it with a wide range of standard terrestrial techniques. And from the moon itself a seismometer and reflector report on moonquakes and earth–moon distances.

Two devices make up the Early Apollo Scientific Experiments Payload (EASEP); the Laser Ranging Retro-Reflector (LRRR) and the Passive Seismic Experiment Package (PSEP). The retroreflector, which sends light directly back to its source, is an 1800-cm^2 array of 100 hollow prisms, each corner-cut from a cube of fused silica.

Carroll Alley of the University of Maryland heads the group that designed the reflector. By aiming Q-switched ruby-laser signals at the reflector and timing the beam's round trip, the group expects to measure the earth–moon distance to within 15 cm. Anyone with the proper ground equipment can use the retroreflector.

The LRRR permits a comparison of general relativity and Brans–Dicke theory, which says that the gravitational coupling constant changes with time. Measurements carried out over several years will test this contention and provide information on mascons, continental drift and the wobbling of the earth on its axis.

The solar-powered seismometer was designed by Gary Latham of the Lamont-Doherty Geological Observatory at Columbia. He, along with

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other observers, is looking for "moonquakes"; their presence would suggest that the moon has a molten core. The equipment was expected to remain functioning for one year.

Who gets what: The aluminum-foil solar-wind detector, which absorbed particles while the astronauts were on the moon, and the samples of lunar soil they brought back with them will be the subject of hundreds of experiments. Many of these will characterize the physico-chemical properties of the samples; spectra, thermal and electrical conductivities and magnetic characteristics will be exhaustively studied. Instrumental (for example, mass-spectrographic, fluorescence and electron-microprobe) and wet methods are to be used for determining the elemental composition of the samples.

Anthony Turkevich, whose alpha-scattering experiment on Surveyor 5 gave information on lunar soil composition (PHYSICS TODAY, December 1967, page 60), is doing studies on Apollo samples too. His gamma-ray spectrometry and neutron-activation analyses determine isotopic abundance. A group headed by Raymond Davis at Brookhaven will be studying argon-37–argon-39 ratios to help determine the age of the moon. They will be using the same low-level counting equipment and rare-gas separation techniques employed in the Davis solar neutrino-flux experiments (PHYSICS TODAY, March 1968, page 73).

Luis Alvarez of the University of California, Berkeley, is to study a sample for the possible presence of magnetic monopoles. Johannes Geiss of the University of Berne, Switzerland, expects to find helium and perhaps heavier rare gases in a sample of the solar-wind detector.

IN BRIEF

A 650-kV Hitachi electron microscope, which cost $250 000, has been installed at the University of California Berkeley campus.

OGO-6, an orbiting geophysical observatory, was launched on 5 June. On board are 25 experiments to study the interaction of solar radiation with the magnetic field of the upper atmosphere and ionosphere. The spacecraft will operate during maximal sunspot activity. □